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The Effect of Concept Mapping on L2 Writing Performance: Examining Possible Effects of Trait-Level Writing Anxiety

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Abstract

Research on anxiety in a foreign language-learning context is well-documented; however, few studies have directly focused on anxiety occurring within writing contexts despite the fact that writing anxiety is known to affect students' learning. The present study examined the effectiveness of concept mapping considering students' writing anxiety. Participants completed writing anxiety scales and were randomly assigned to three groups before completing a writing task: concept mapping, idea listing, or an unrelated task. Results indicated that, especially for students with low trait-level writing anxiety, concept mapping positively influenced the quality of writing content. Teaching implications will be discussed in the light of the results of this study.

Keywords: concept mapping, planning, writing anxiety

1. Introduction

Research on foreign language learning anxiety has been conducted since the 1980s with a focus mainly on anxiety accompanying speaking. In fact, little research has been done on the anxiety entailed in the learning of other skills including writing. Results of previous studies indicate that university students have difficulties with writing (Dalsky & Tajino, 2007; Lee & Tajino, 2008), and it can be presumed that students who have difficulties with writing may also have anxiety with writing. Most research on anxiety has found that anxiety negatively influences writing performance (Horwitz et al., 1986) and considering this relationship, it is important to focus on the ways that enable students with high anxiety to produce compositions with high quality to encourage students to improve their writing performance. This study focuses on concept mapping as a possible way to help such highly anxious students by examining the effectiveness of this technique with Japanese university students. Through examining the effectiveness of the concept mapping technique, the present study could suggest ways teachers may improve the writing of students with high anxiety.

2. Literature Review

2.1 Foreign Language Anxiety

Generally, anxiety can be defined by an uncomfortable emotional state or cognition with subjective feelings of tension, apprehension, and worry, with activation or arousal of the automatic nervous system (Spielberger, 1972). According to Spielberger (1966), anxiety can be divided into two categories: trait anxiety and state anxiety. Trait anxiety refers to a relatively stable personality trait, whereas state anxiety refers to a temporary condition experienced at a particular moment. However, in foreign language classroom settings, another type of anxiety called situation-specific anxiety needs to be taken into consideration (MacIntyre & Gardner, 1991). This type of anxiety appears in a situation that requires the use of L2 that the individuals cannot use freely (Horwitz et al., 1986). Cheng et al. (1999) argue that the scale developed by Horwitz et al. (1986) focused too much on the anxiety entailed with speaking the language, and anxiety that appears when learning other skills should be defined more precisely and measured with other scales. Among them, writing anxiety is the fear or apprehension an individual may feel about the act of composing written materials (Daly, 1991). It can be defined as a type of situation-specific anxiety, because it occurs in language learning contexts. Students with writing anxiety are likely to be unwilling to write and avoid situations where writing is perceived as required and even tend to select

jobs that do not to require them to write (Daly & Miller, 1975a; Daly, 1978).

2.2 The Effects of Planning on Writing

There is limited research that has explored ways to help students with high anxiety produce good compositions. One of the few studies, conducted by Sugita (2003) measured the level of university students' writing anxiety before and after one month of learning process writing. The results of the questionnaires in this study suggested that teaching how to plan is an effective method to improve their writing. In addition, according to Asmari (2013), students with high anxiety do not take sufficient time to prepare for writing and set goals for writing. Therefore, learning a way of planning might be an effective strategy for students with high anxiety.

Planning is the stage where writers establish goals for writing, think up ideas that relate to the goals, and organize the ideas to facilitate action. Planning can be divided into two types: pre-task planning and on-line planning (Ellis, 2005). These two types of planning differ in the timing of the planning, either before or during the task. Ellis and Yuan (2004) found pre-task planning reduces the cognitive strain placed on working memory and allows greater attention to the next translation stage, where writers select lexical units and syntactic frames needed to encode the ideas generated through planning. This process was found to lead to increased fluency and syntactic complexity.

2.3 Concept Mapping as a Way of Planning

Concept mapping is a pre-task planning process that involves drawing diagrams of circled ideas and links connecting them (Figure 1). Novak and Cañas (2008) claim that drawing this type of diagram allows writers to organize ideas in a hierarchical order and see how one concept is related to another concept. This technique has been widely used in language learning for memorizing vocabulary (Morin & Goebel, 2001; Johnson & Steele, 1996) and has been found to facilitate the process of writing (Lee, 2013). Schultz (1991) also argues that concept mapping helps learners to visualize their ideas as multidimensional constructs that imitate the movement of thought. In relation to planning, Ojima (2006) claims that concept mapping can activate students' prior knowledge about a topic. Ojima tried to explore the effect of concept mapping on students' writing development; however, she did not examine the effect of the technique statistically with a large number of participants and she did not determine whether concept mapping would aid students with high anxiety. Therefore, the present study focuses on how concept mapping can affect students' writing and whether this technique can aid highly anxious students.

To be sure, previous studies have demonstrated the effectiveness of concept mapping, but each study has its limitations. Lee (2013), for example, mainly focused on the effect of collaboration on writing. Moreover, she did not examine its effect on fluency, a measure for which Ojima (2006) found an effect of concept mapping. Considering that Norris & Ortega (2000) argue that outcome measures do lead to a remarkable difference of the instructional effectiveness, the specific aspects for which concept mapping is effective (e.g., writing fluency and writing quality) should be clarified.

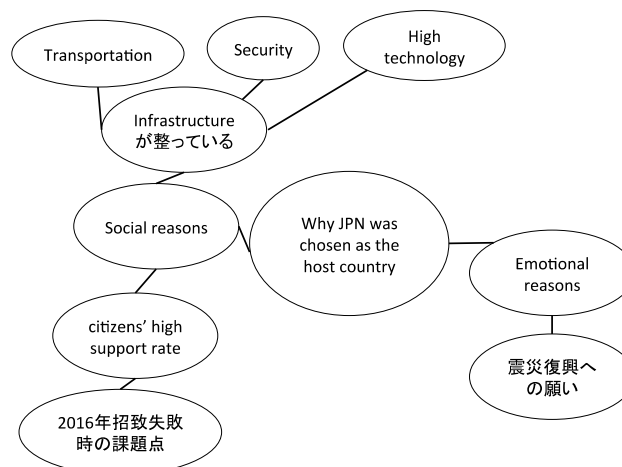


Figure 1. Example of a concept map

2.4 Purpose of the Study and Research Question

The purpose of this study was to investigate how concept mapping as pre-task planning can influence students' writing in relation to students' anxiety and the following research question was addressed.

Research Question: Is concept mapping more effective for improving writing proficiency for students with high writing anxiety or low writing anxiety?

3. Method

3.1 Participants

The participants were 61 first- and second-year undergraduate students at a leading research university in Japan. They were enrolled in an academic writing class taught by the same professor for one semester. In his class, concept mapping had not been introduced. The experiment was conducted on the last day of school year. Students who had reported experience with staying in foreign countries were eliminated from data analyses.

3.2 Materials

a) Writing anxiety scale

A translated version of the modified "Daly-Miller Writing Apprehension Scale (WAS)" (Daly & Miller, 1975b) developed by Sugita (2003) was used in this study. This scale was revised for Japanese learners of English. The scale was used to measure the level of anxiety students feel while writing in L2. It consists of 26 items with a 5-point-Likert scale ranging from "strongly disagree (1)" to "strongly agree (5)". The Cronbach's alpha for the present study was .92.

b) General questionnaire

A general questionnaire was developed to ask students of their prior experience of staying in English-speaking countries and to receive their comments about their experience with the planning.

3.3 Procedure

At the beginning of the experiment, students were randomly assigned to one of three groups: a concept mapping (CM) group, an idea listing (IL) group, and a no planning (NP) group. They were given packets of sheets consisting of the consent form, WAS questionnaire, instructions, worksheet, and the general questionnaire. First, they were asked to fill out the consent forms and answered the 26 items of WA scale. Then, students were told to read instructions. Different instructions were given to different groups. Instruction for CM group was about how to draw concept maps, and that for IL group was about how to list ideas. Instructions for students in the control group students related to how to infer the meaning of the unknown words. After that, students of different groups worked on different activities for 10 minutes. CM students drew concept maps on a given topic, IL students listed ideas on the same topic, and NP students worked on vocabulary matching activities on each. The topic given to CM and IL students was to describe the reasons why they chose their academic department at their university. After 10 minutes, all of the students were asked to write an essay about the topic described above on Edmodo, a web-based learning platform specially designed for educational use, which they had been using throughout the semester. Finally, they all answered the questionnaire.

4. Results

Before analyses, learners were statistically divided into two groups based on the median anxiety score: a low anxiety and a high anxiety group. After that, a two-way analysis of variance (ANOVA) with three levels of planning (CM, IL, NP) and two levels of anxiety (high, low) was conducted.

4.1 Holistic Scoring

To assess writing proficiency holistically, the TOEFL writing rubric was adopted in this study. It is a qualitative holistic scoring measure that assesses written text in terms of development, organization, and appropriate and precise use of grammar and vocabulary. The authors analyzed all the essays on the rubric on a scale of 0 to 5, blind to conditions. Inter-rater reliability (Cronbach's alpha) was acceptable (.83). The holistic scores were subjected to a two-way ANOVA. The interaction effect was not significant, $F(2, 54) = 1.48, n.s.$, partial $\eta^2 = .05$; however, the main effect of planning yielded an F ratio of $F(2, 54) = 5.05, p < .05$, partial $\eta^2 = .16$. Post hoc analyses using the Tukey HSD post hoc criterion for significance indicated that the mean score was significantly greater for students in the CM group ($M = 3.06, SD = 0.85$) than for those in the NP group ($M = 2.18, SD = 0.71$). Moreover, the main effect of anxiety yielded an F ratio of $F(1, 54) = 6.54, p < .05$, partial $\eta^2 = .11$ indicating that the mean score of students with low anxiety ($M = 2.91, SD = 0.78$) was significantly higher than that of students with high anxiety ($M = 2.40, SD = 0.80$).

To test for specific group differences in anxiety and treatment condition on the qualitative holistic scoring measure, a post-hoc analysis using the Bonferroni criterion was conducted. It revealed that for the low anxiety students, the main effect of planning was significant, $F(2, 53) = 6.03$, $p < .01$, partial $\eta^2 = .19$, as the CM group outperformed the NP group ($p < .01$), though no difference was found between the CM group and the IL group. In contrast, for the high anxiety students, the main effect of planning was not significant, $F(2, 53) = 1.43$, $p > .05$, partial $\eta^2 = .05$, indicating there were no differences between the CM group and the other two groups (see Figure 2). For a summary of the descriptive statistics, see Table 1.

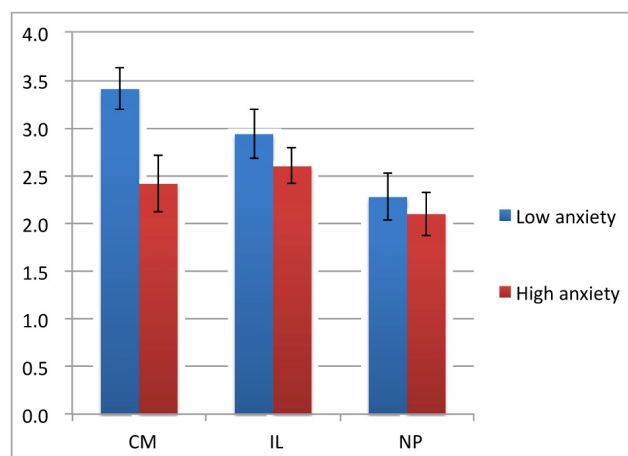


Figure 2. Quality holistic scoring results for the three conditions

Table 1. Descriptive statistics related to quality holistic scores for the three conditions

Planning	Anxiety	<i>n</i>	<i>M</i>	<i>Std. Error</i>	95% Confidence Interval	
					Lower Bound	Upper Bound
CM	Low	11	3.41	.22	2.97	3.85
	High	6	2.42	.30	1.82	3.01
	Total	17	3.06	.21	2.62	3.49
IL	Low	8	2.94	.26	2.42	3.45
	High	15	2.60	.19	2.22	2.98
	Total	23	2.72	.15	2.40	3.04
NP	Low	9	2.28	.24	1.79	2.76
	High	10	2.10	.23	1.64	2.56
	Total	19	2.18	.16	1.84	2.53

Note. One participant was excluded from the NP group (low anxiety), because the student commented he had made an outline before writing.

4.2 Fluency

To assess writing proficiency analytically, total number of words was used as a measure of fluency. To determine the relationship between holistic scores and fluency, a Pearson's product-moment correlation coefficient was calculated. A weak correlation was found between the two outcome measures, $r = .36$ ($df = 57$, $p < .01$).

The total number of words produced by students was subjected to a two-way ANOVA. The interaction between anxiety and planning was not significant, $F(2, 54) = .29$, *n.s.*, partial $\eta^2 = .01$, nor was the main effect of planning, $F(2, 54) = .75$, *n.s.*, partial $\eta^2 = .02$. However, the main effect of anxiety yielded an *F* ratio of $F(1, 54) = 6.54$, $p < .05$, partial $\eta^2 = .10$, indicating that the mean number of words produced was significantly greater for the low anxious group ($M = 219.89$, $SD = 45.65$) than for the high anxious group ($M = 191.90$, $SD = 47.82$). To test for specific group differences in anxiety and treatment condition on word fluency, a post-hoc analysis using the Bonferroni criterion was conducted. It revealed that the main effect of planning on fluency was not

significant for low ($F(2, 54) = 0.08, p > .05$) and high anxiety students ($F(2, 54) = 0.87, p > .05$) (see Figure 3). For a summary of the descriptive statistics, see Table 2.

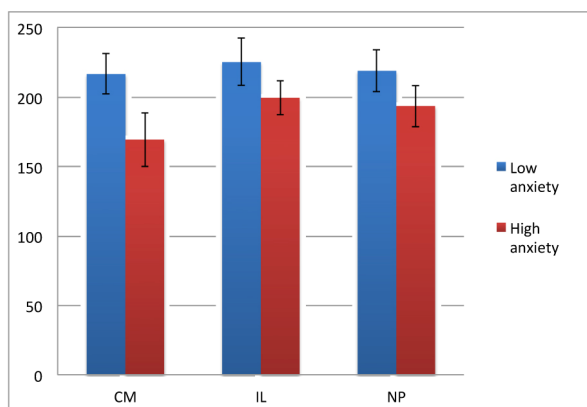


Figure 3. Average word production by condition

Table 2. Descriptive statistics related to word production for the three conditions

Planning	Anxiety	<i>n</i>	<i>M</i>	<i>Std. Error</i>	95% Confidence Interval	
					Lower Bound	Upper Bound
CM	Low	11	216.73	14.37	187.92	245.54
	High	6	169.50	19.46	130.49	208.51
	Total	17	200.06	11.19	176.33	223.79
IL	Low	8	225.38	16.85	191.59	259.16
	High	15	199.67	12.31	174.99	224.34
	Total	23	208.61	9.04	189.86	227.36
NP	Low	10	219.00	15.07	188.78	249.22
	High	10	193.70	15.07	163.48	223.92
	Total	20	206.35	12.83	179.50	233.20

4.3 Students' Impressions towards Planning

To further examine whether the students in the CM group students regarded concept mapping as effective, students in the CM group were asked their impressions towards this technique. As Figure 4 shows, 80% of them answered this technique was useful in coming up with ideas before writing, though 20% commented this strategy was not so useful.

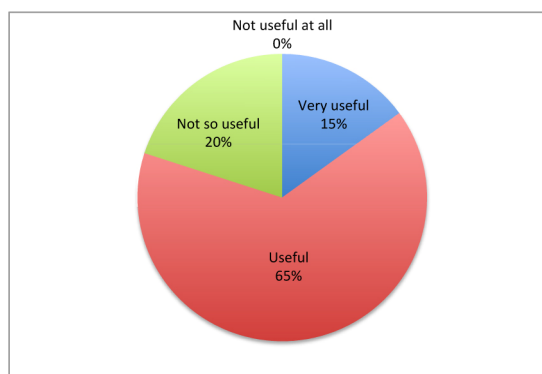


Figure 4. Students' perceived usefulness of concept mapping

5. Discussion

The purpose of this study was to examine how concept mapping influences students' writing in terms of quality and fluency and to examine differences between students with high and low anxiety in each planning condition.

Though the interaction effects did not reach the conventional levels of significance perhaps because of the limited number of students that participated in the study, results of post-hoc tests revealed that students with low anxiety benefited more from the concept mapping technique than those with high anxiety. From these results, it can be inferred that students with low anxiety could immediately adopt and use concept mapping well. On the other hand, those with high anxiety had difficulty using this strategy and seemed to have been confused by its sudden introduction. This indicates that teachers should pay special attention to such highly anxious students especially when a new technique is introduced in writing contexts.

Additionally, results of the study suggest that concept mapping positively affects students' writing in terms of writing quality, based on the significant mean difference in qualitative holistic scoring between the CM and NP groups. In contrast, in terms of fluency (the length of students' written products), the results did not reveal the effectiveness of the planning technique. However, considering the results of a weak correlation between holistic scoring and the length of written texts, fluency by itself may not be enough as a measure of writing proficiency. Future research should include accuracy and complexity, which seem to be better measures for scaling students' performance, in combination with fluency.

Though there was statistically no difference between the CM and IL group for either outcome measure, from the questionnaire, one potential problem of another technique for writing (i.e., idea listing), and one potential strength of concept mapping were revealed. One student from the IL group answered that (translated from Japanese) "I had difficulty to make a consistent explanation. If I had been told to list ideas in a chain reaction, I could have written a better sentence". Another student from the CM group commented, "I could successfully organize paragraphs because I was able to divide reasons from a broader perspective". From their comments, it can be inferred that idea listing is not a perfect method and concept mapping has the possibility to facilitate better organization of products. Therefore, effects of both planning techniques should be examined in depth.

There are some limitations of this research. First, a methodological problem with this research is the limited number of planning training sessions. That is, it would be too hasty to conclude that concept mapping is not an effective technique for some students to improve their writing performance only based on the results of this single experiment with one treatment session. Second, the way instructions were given to students might be another problem. The instructions were given by worksheet, not by a lecturer (in order to randomly assign the task to students in the same class). Therefore, there is the possibility that some students might have had difficulty in understanding how to produce concept maps from the instruction sheet. Third, the writing task adopted in this study did not include the type of prompts that regulate the rhetorical modes of writing. Therefore, some students who decided to write using a narrative writing style might have found it difficult to write an essay using a concept map which seems to be effective for enumerating ideas and connecting superordinate and subordinate concepts. Finally, students in the NP group were not given time to prepare for writing, so the better performance in the CM condition might have been simply due to the longer time they had.

Future longitudinal research is needed to examine the effects of concept mapping on students' writing because learning a planning technique can take some time. Moreover, the kinds of rhetorical modes of writing a concept map that can be improved should be explored in more detail.

In spite of its limitations, this study contributed to revealing the effectiveness of concept mapping for low anxiety students and found that anxiety does influence learners' learning L2 writing. The results bring implications for teachers; namely, that the learners' level of anxiety should be taken into consideration when new techniques are introduced to them.

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